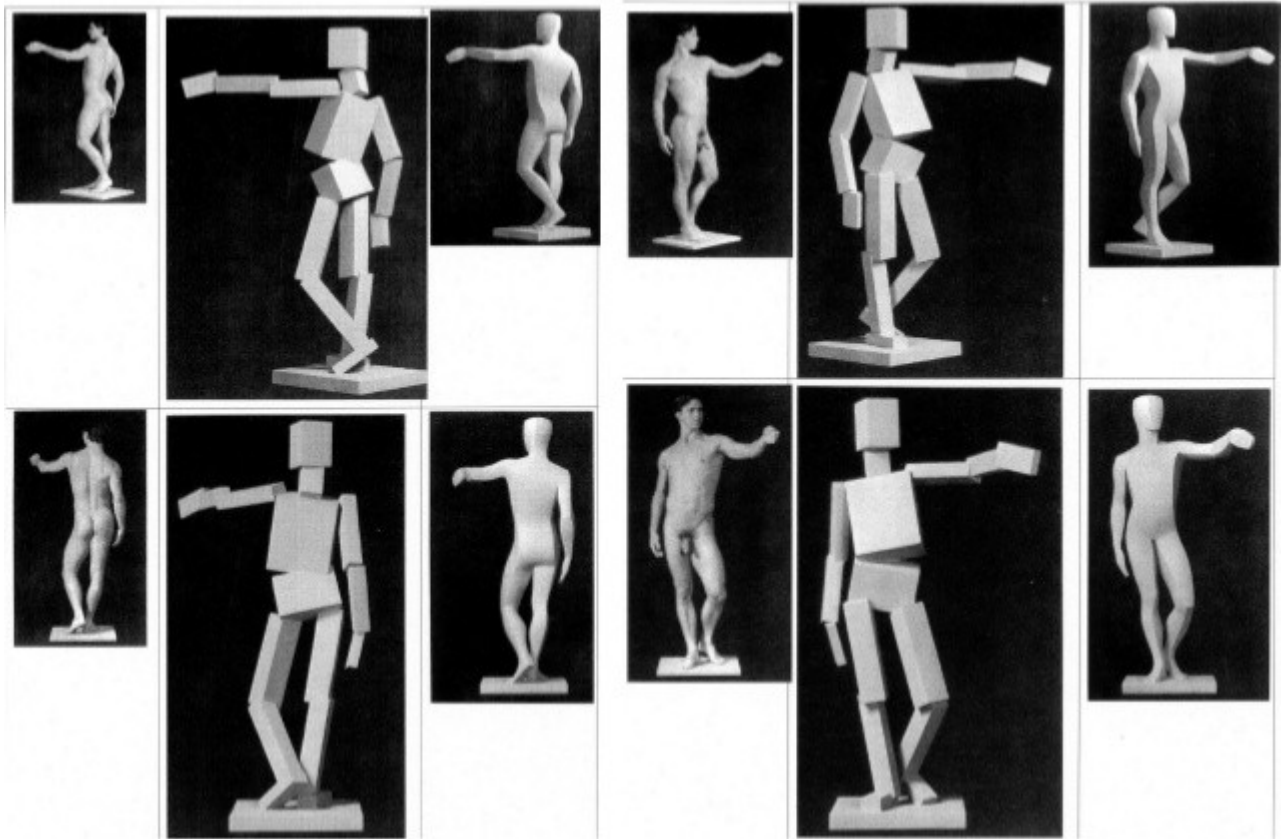


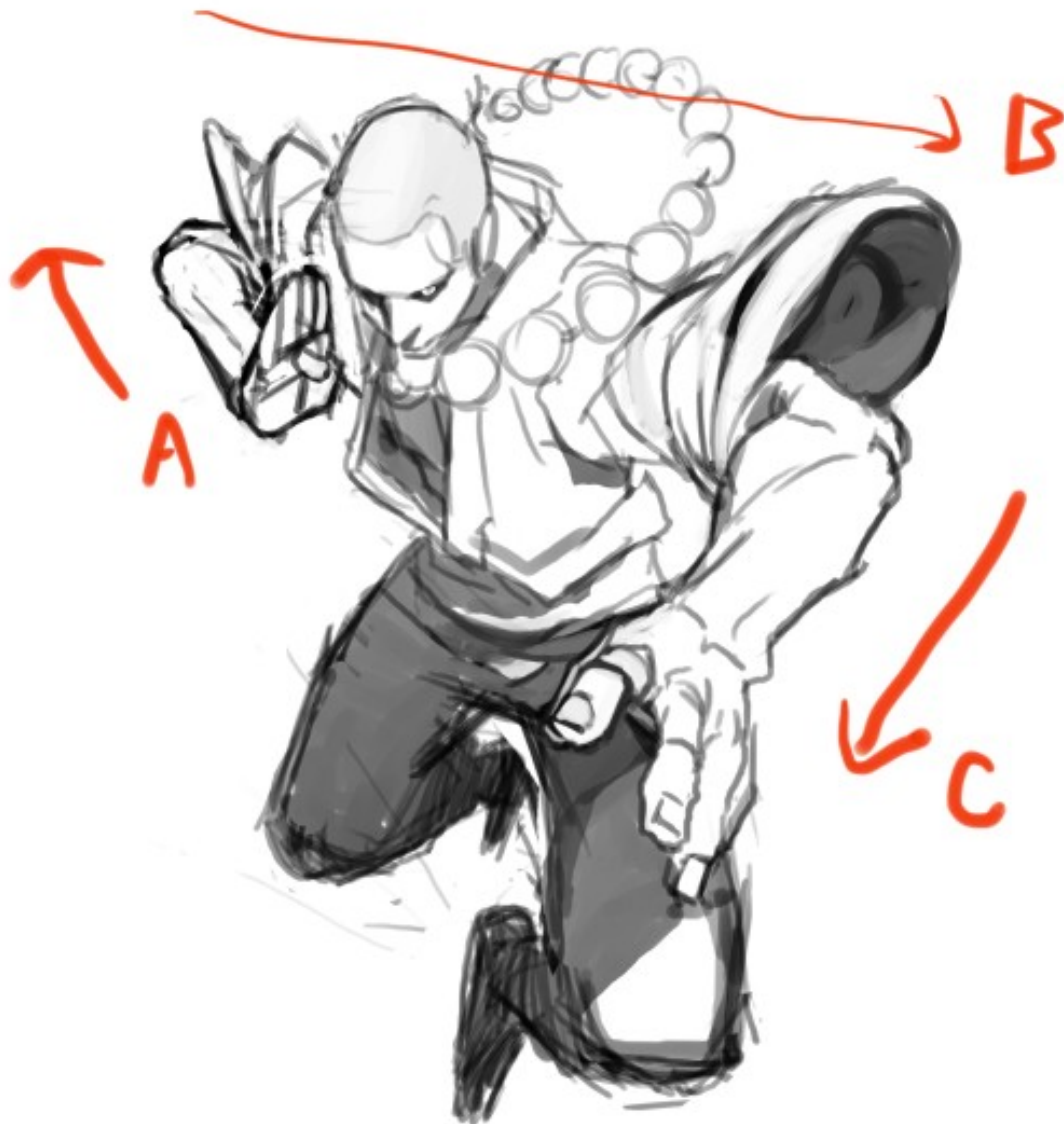
Domino-2 rotations and its appliance

When going through some tutorials, we could often see contents like such:

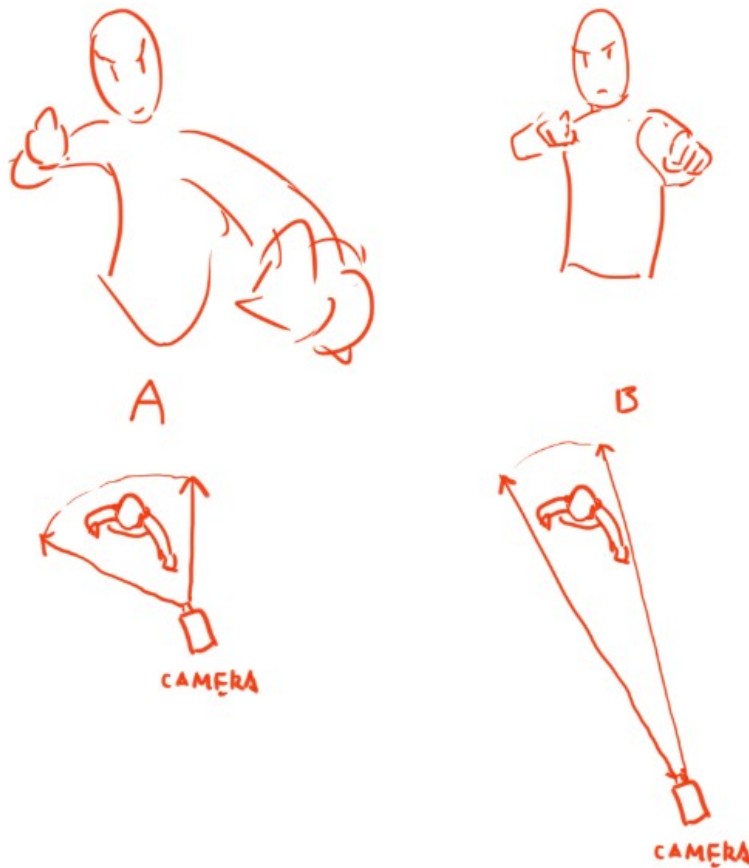
三、「體感的建立」之前導，圖片取自 Eliot Goldfinger, Human Anatomy for Artists 簡化人體



The content was discussing how to understand body parts as geometrical objects. In my learning experience, the most confusing of all was to understand how these boxes cooperate with perspectives when rotating. In the last session, we have discussed about how objects are drawn under perspectives with rotations, this time we will continue with the same concepts to explain these boxes.



This is one of my old paintings. In the past, while I was drawing such pose, I was quite confused by the A-B-C, arm-shoulder-arm proportion enlarging scale. How large should it be? How long should the arm be? How much influence will the muscles curves bring?

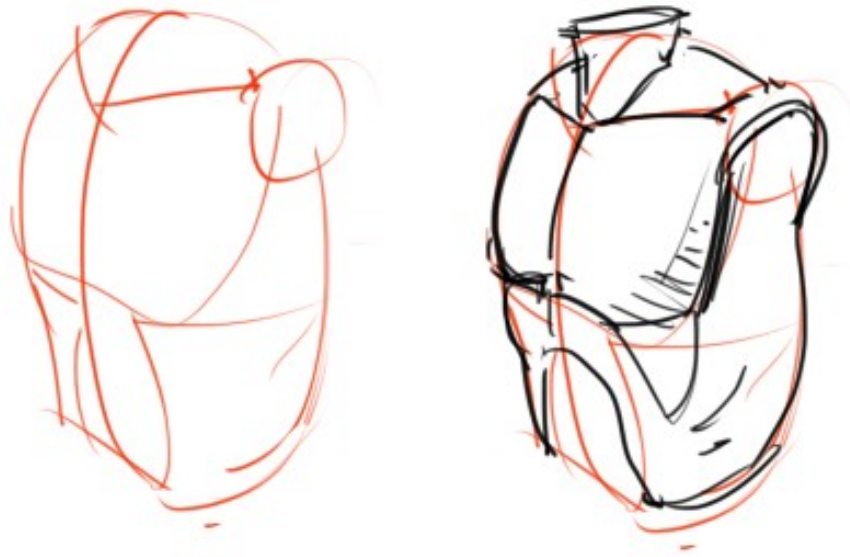


For the figure A, it was shoot with the camera up close to the person; As for the figure B, shoot from a distance. About the control of the camera, the discussion in perspective tutorials are mainly set with wide-angle lens or telephoto lens, we will not discuss this part at the moment. But we could have some basic understanding that: the figure's perspective compressing rate will be more obvious, and the perspective affects less on the figure B.

(imagine the contrasts of seeing this figure right in front of you and at a 20 meter distant)

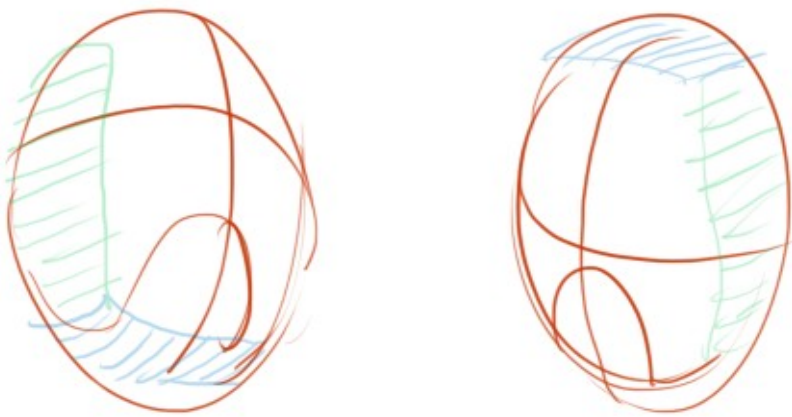
What we are going to paint is like figure A, where perspectives have bigger influence on the compression by distance.

#1 When a random objects is drawn on the picture, it actually define the <space> (the angle between the object and the camera are constructed)



If I draw a chest on the picture, I used to draw like the red lines one above, generally drawing out the ribs, and marking out the chest muscles and the collar bones, then go on into details.

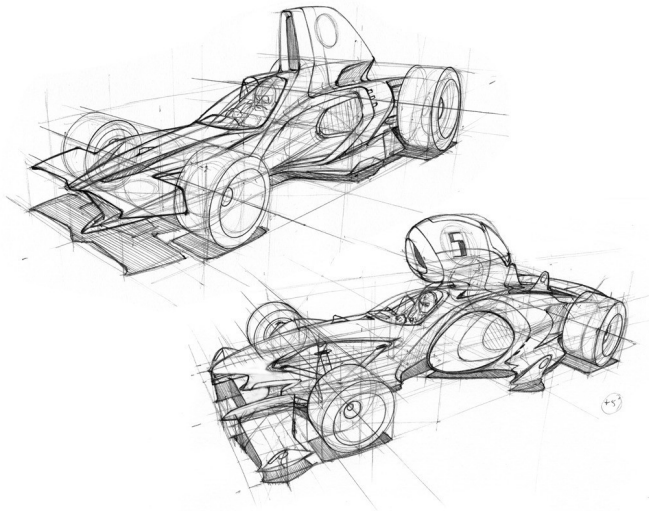
In the past when I have less understanding in perspectives, such method would work roughly drawing at the eye level and would not cause much problems (since most proportion relations could be identified with bare eye), but if I wanted to draw in angles of elevation or depression, I won't be able to draw them in "chest in angles of elevation" or "chest in angles of depression", because you started drawing with an oval, and oval is hard to take into practice of perspectives.



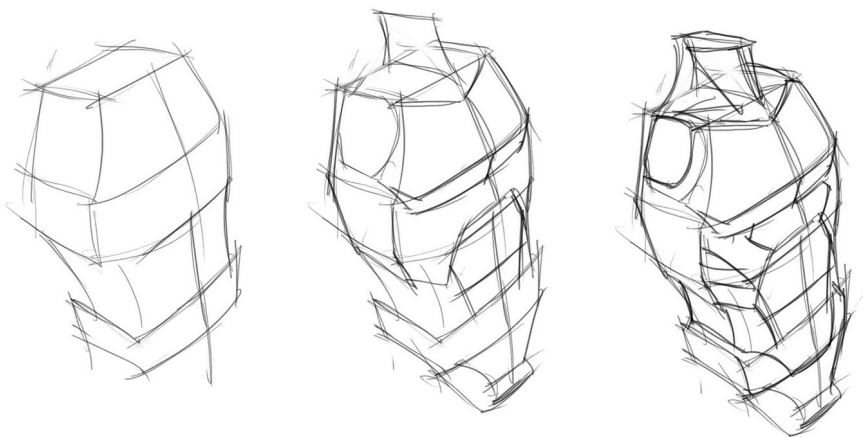
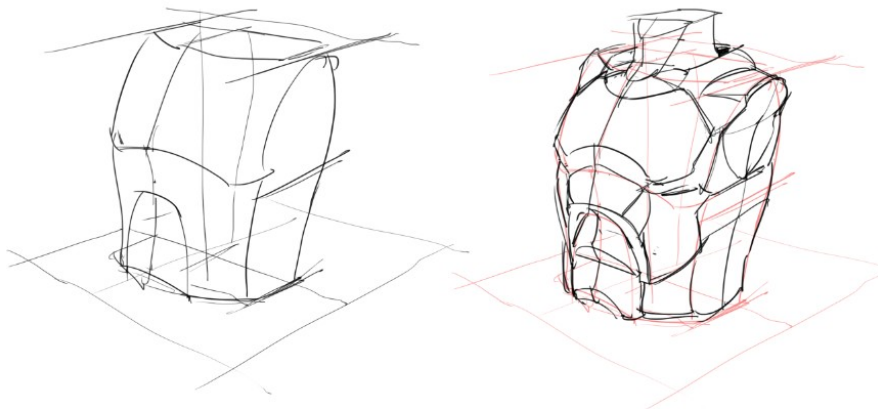
(I often get confused in judging of the volume of the green and blue area)

After studying some tutorial of perspectives and structures, like Scott Robertson's *How to Draw*, and some student artworks that FZDschoool had released, I came to realize that all objects should

have the perspective axis in X, Y and Z three directions.



(picture taken from Scott Robertson's demonstration and FZDschooll students' artwork)

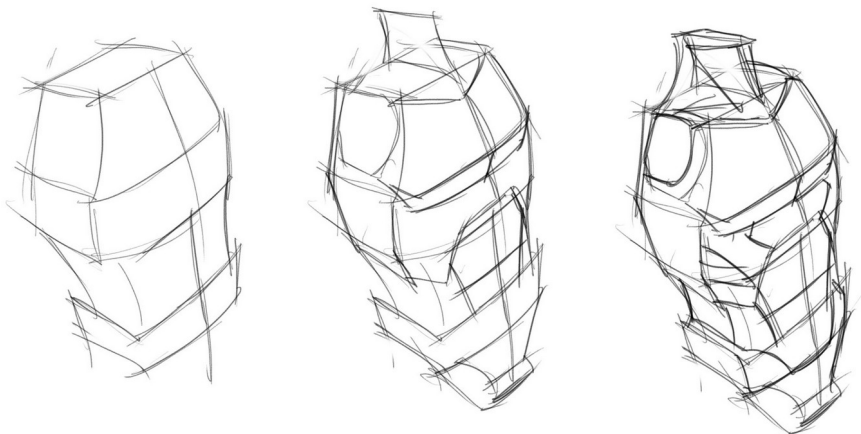
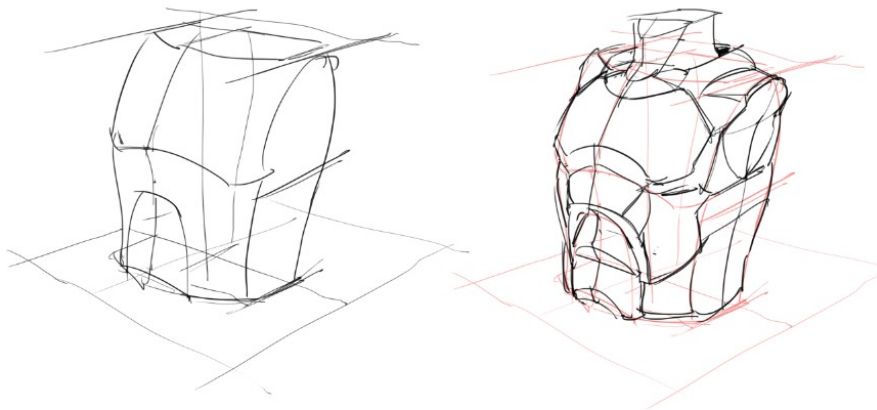


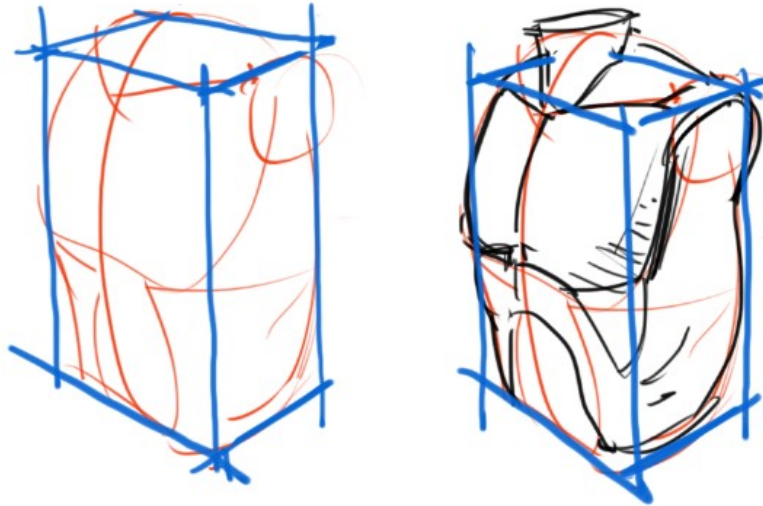
Then I started to view the human structure as a “product”, and trying to draw it with a more accurate perspective relationship.

As below, rather than drawing human anatomy, it is more like drawing figma, replacing the soft tissues and muscles with hard curving outlines.

In such practice, I have understand one thing: **When an random objects is drawn on the picture, it actually define the <space> (the angle between the object and the camera are constructed)**

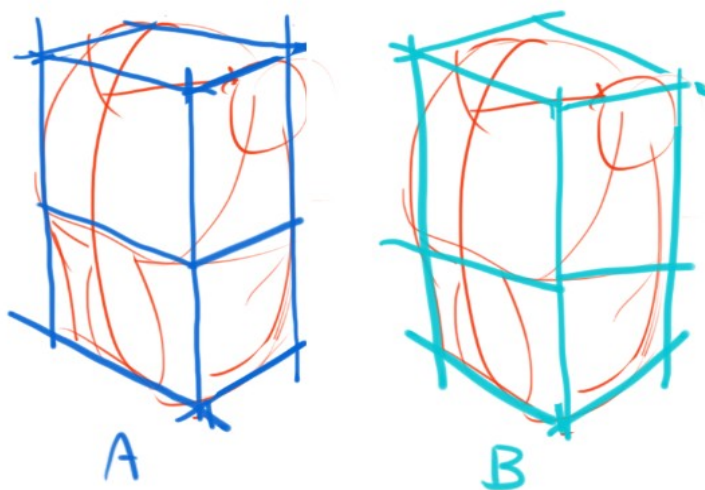
When we draw a 3D object on the paper, it defines the angles of relation with the camera, and the space's perspective state.





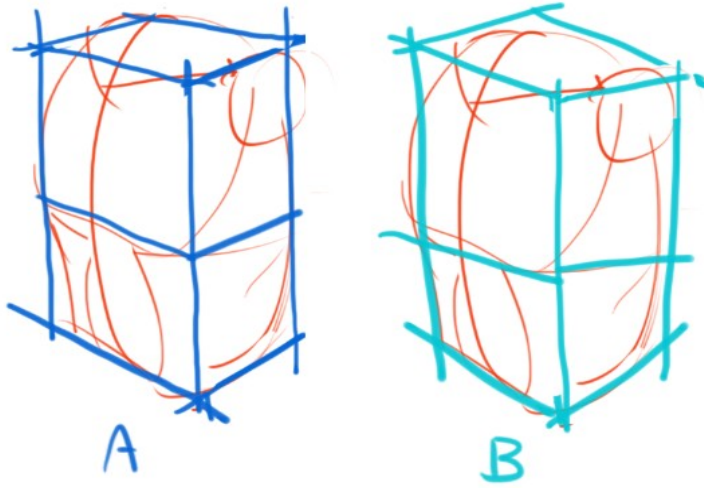
Hence, even if I started with the oval shape, there should be a set of accurate perspective relation in behind.

For this part, most of the people could have understood the geometrical relationship in theory. But when taking it into practice, some common mistakes are like such:

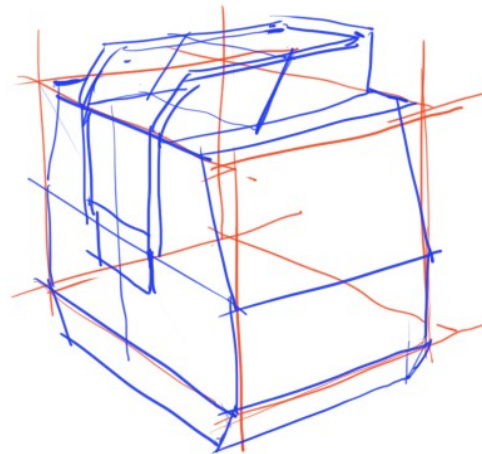
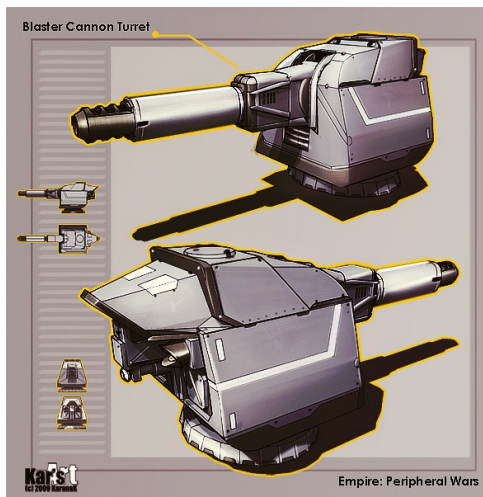


With some perspective training, most artist could get grasp of a “solid” square should look like, like picture. However if one could not achieve “perspective lines needed to be straight, the vanishing point should be the same” such situation, it may resulted in drawing the cube into B that seems to be a bit weak.

How would that “weak body” affect the whole picture?



Try to think of such situation: If I am not going to draw a nude character, but a figure with “a heavy armor”, you will need to have powerful supporting lines to help the figure to equip it.



For example, I would like to have the figure wearing a set of armor like above, then I would analyze the volume of the armor in structure through sketch.



Then adapt it on the “solid cube”.

But, if adapting it on the “weak body” that doesn’t have a good set of perspective axis, then the armor will look strange.

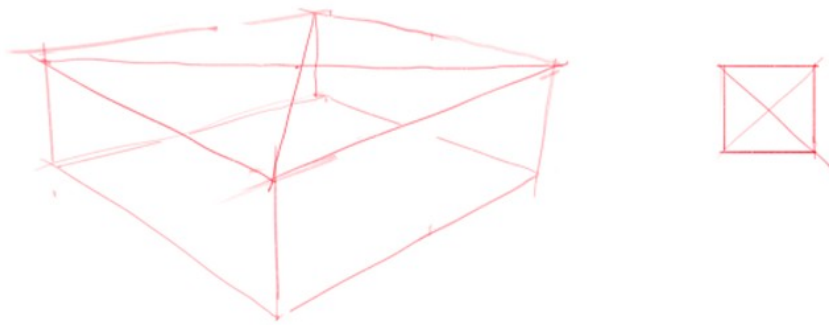
Here are some of the points:

1. Every objects has its own perspective in space
2. The first set of 3D object will define the picture of space and perspective.
3. Most of the time, the problems does not lies in “understanding the cube in behind the object”, the problem is that when taken into practice, you have tilted the cube, and resulted in a weak figure.

#from a set of cube, the information that we could get

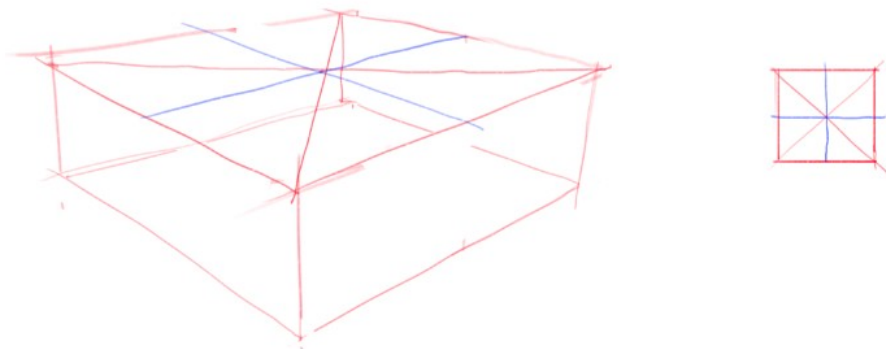
In the last session, we have discussed how to rotate the cube, and this time we will use another method.

As mentioned earlier, when we draw a set of objects on the paper, it also brings along a set of space and perspective behind the cube. How much information could we get from this particular set of cube?



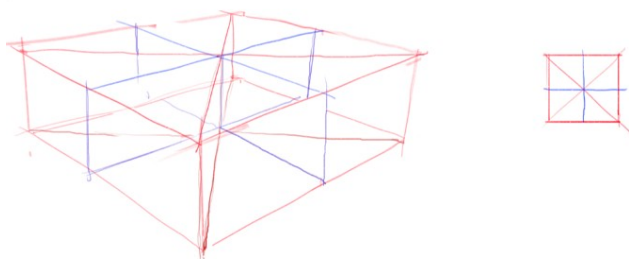
Firstly, I draw out a 45 degree box, and use the diagonal line to link the corners together.

Draw the blue cross in the middle of the box; this method helps in most perspective tutorials to find where the middle of the side is.

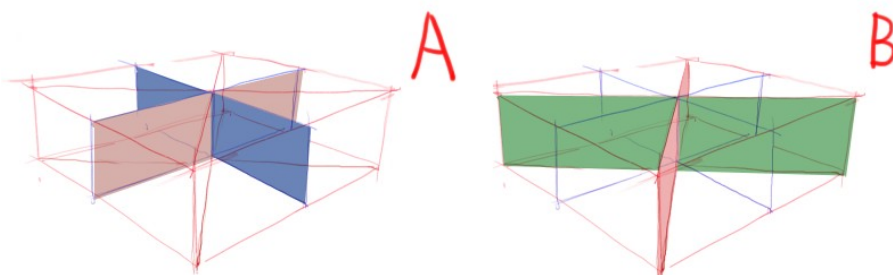


Then we do the same thing on the bottom of the box, and connect them together. We will see two plane constructed by the diagonal lines and two by the midlines on the picture.

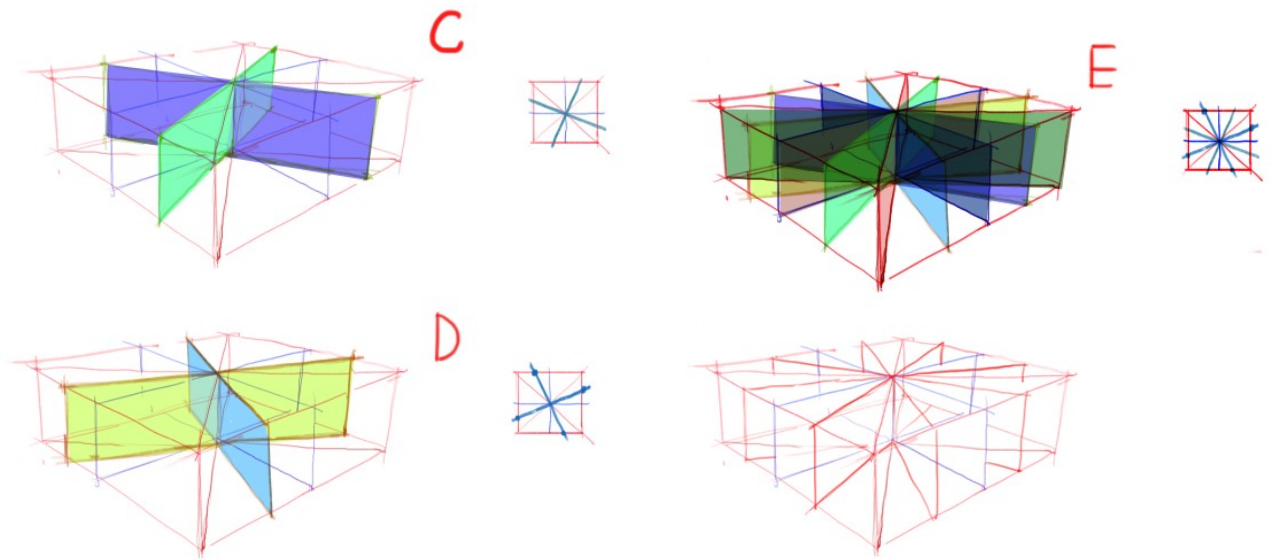
This method of finding the midlines with the diagonal lines would also help us to acquire a plane



(A) within the box, and another set of plane (B) that is vertical with the former one.



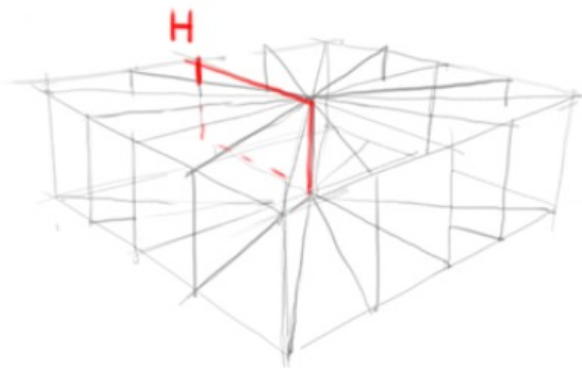
And so on, we build up other planes C and D in the middle of A and B, then we will come up with a domino like structure (E).



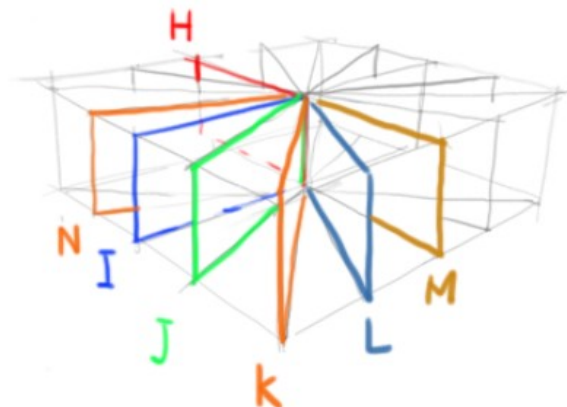
That is to say, from the original box, we could come up with a variety of planes that rotates on the same surface.

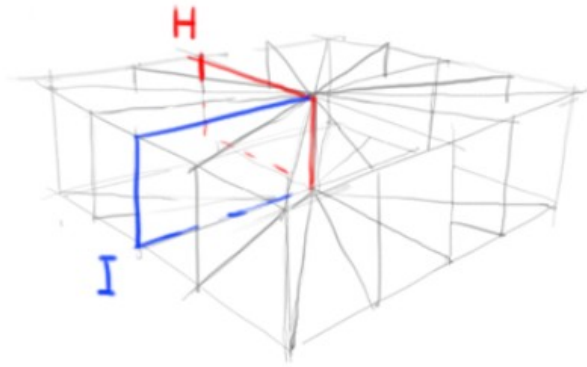
Then, how would we use the planes?

Here I will be demonstrating, let us start with the plane (H)

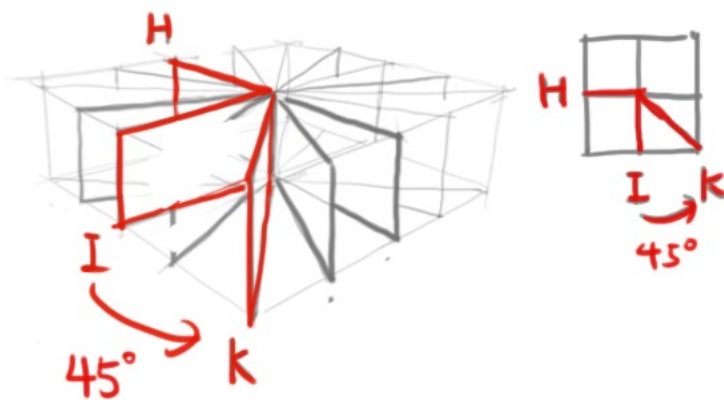


When I draw the plane (I), I would notice the angle between (H) and (I), they are vertical to one the other.

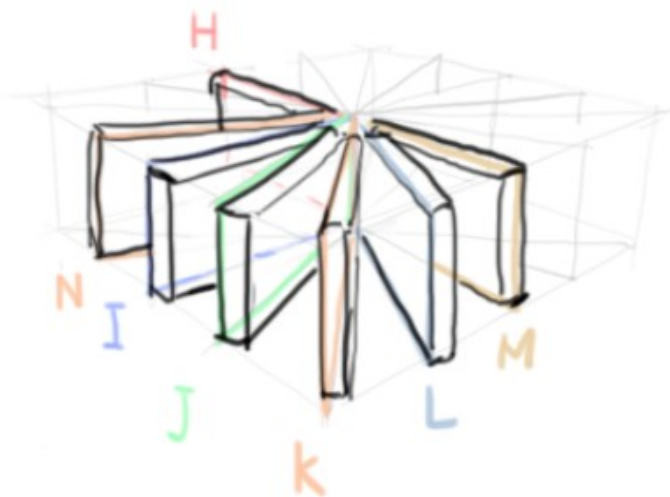




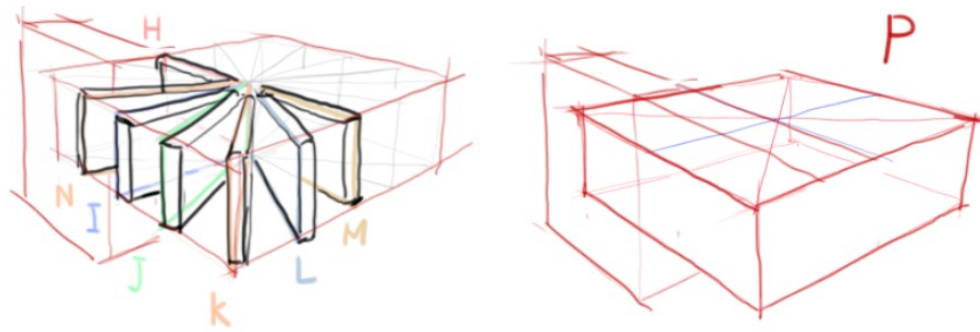
As we go on to define the other planes J, K, L, M and N... we could see the angles between them, and see how they are different in the direction of perspective compression.



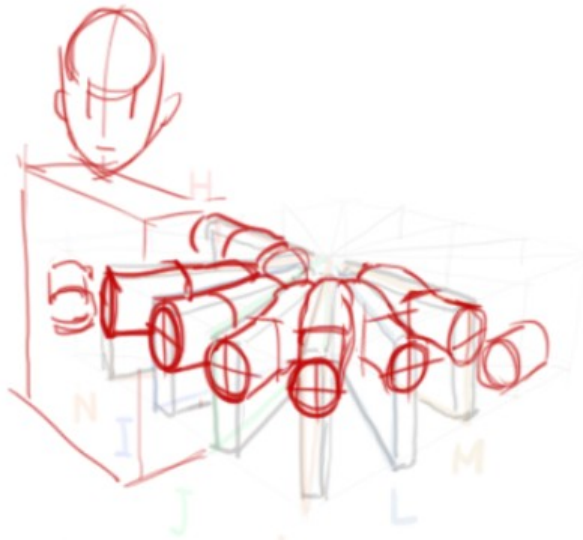
(For example, I started with (H) and (I), and I will notice that (K) is the result of (I) rotating 45 degree.)



And I add some thickness toward the planes (there are some major points about the thickness part, it will mentioned later on)

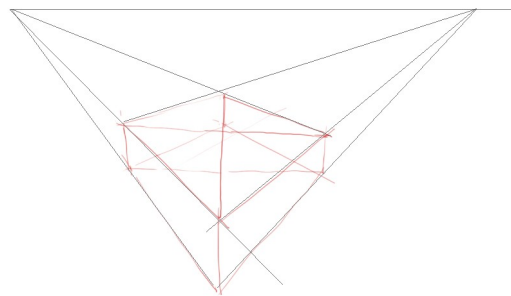
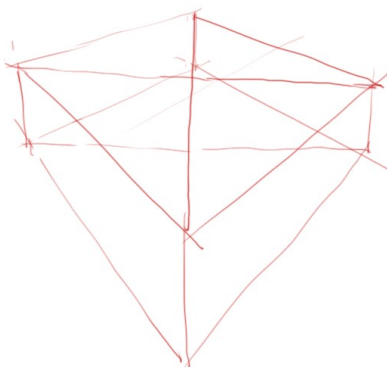


Then we draw another set of box next to the original one (the picture P is for better identification of the whole picture)

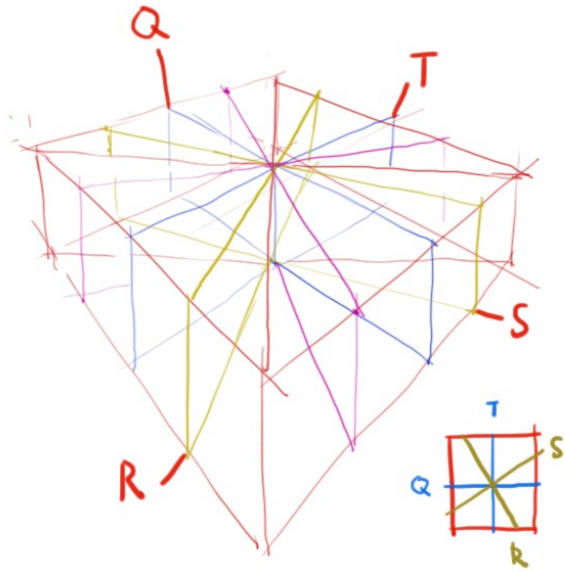


If we seek the new box as the body, and the planes as the arm, we would understand more accurately where the position the arm is.

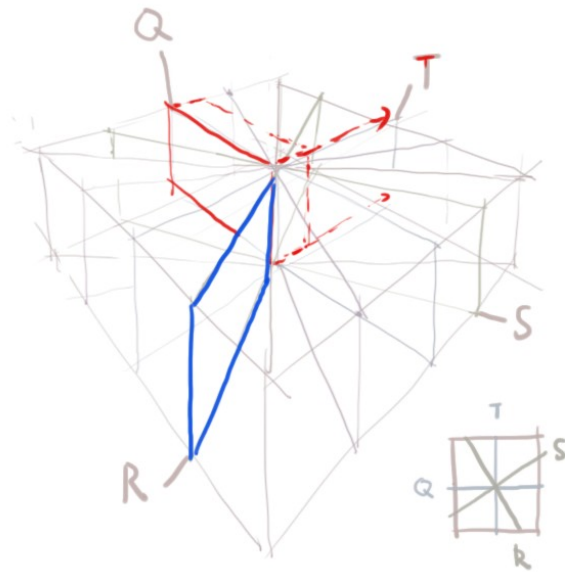
That is, taking what we used to draw by “sense” and define it with “coordinate”.



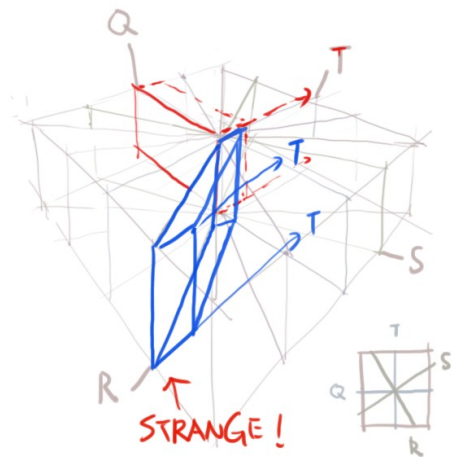
Now, we start with a box with a stronger perspective.



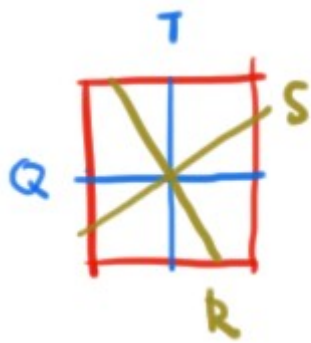
Using the same steps, we will find out that the angles and perspective compression are more obvious. Then I will focus on Q and R for further demonstration. Add on thickness to Q and R. Since Q has the same perspective with the original box, we could rely on T which is vertical with Q.



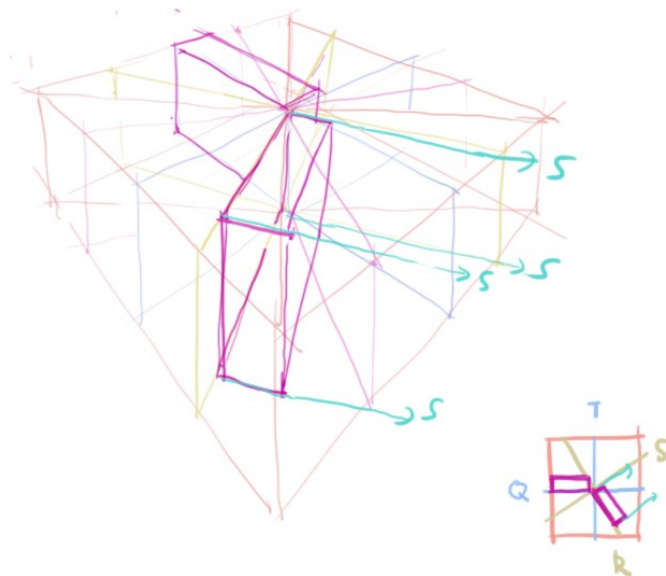
But when we are adding thickness to R, we will meet a question: which set of plane should we use to be vertical with R? The direction of R is different from the original box, so we could not use the same set of T to apply on it. If we do so, the whole picture will look strange, like below:

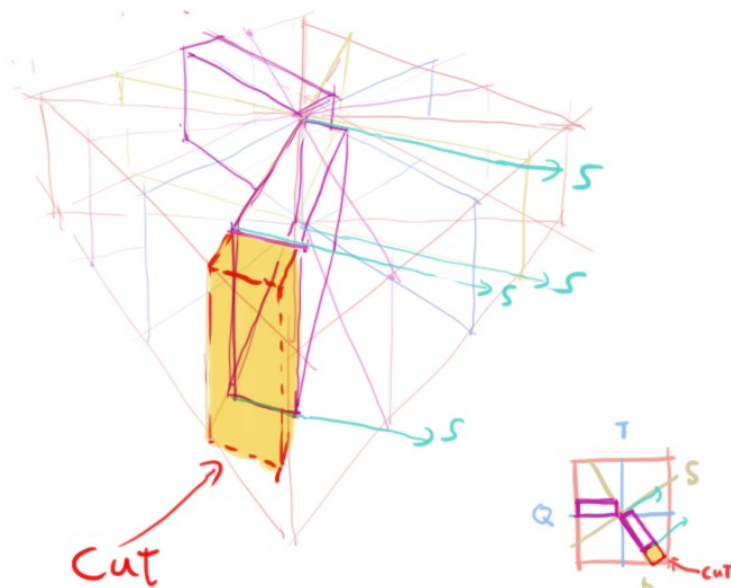


When we look at the box from top view, we can see clearly that the one corresponding to R is the plane S.

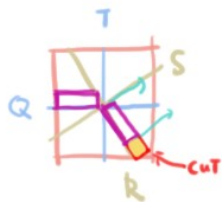


After adding on thickness on Qt and Rs, we will get two sets of boxes like below:

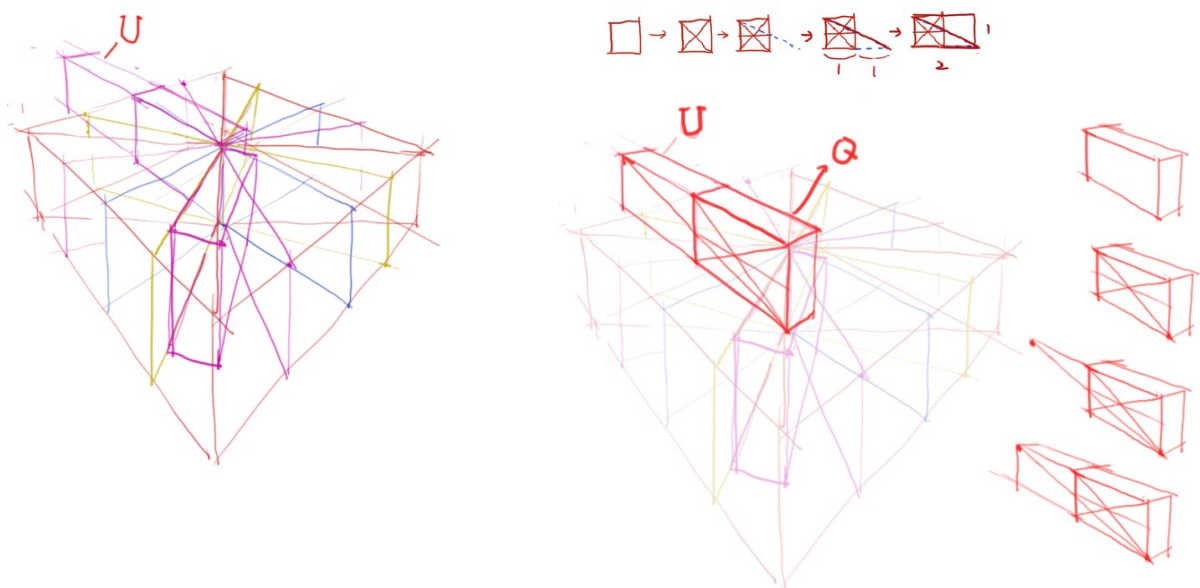




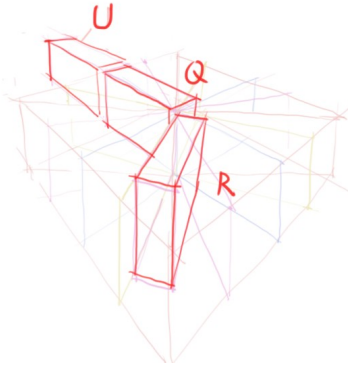
In order to have the two boxes equal in length, so I did not draw R to its full distance, cutting off 1/4 of its original length.
 (From the top view, we could observe how long R should be to be equal to Q)



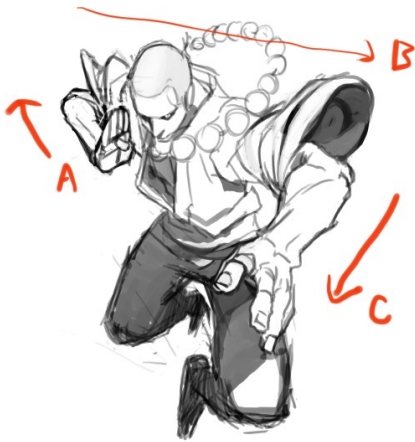
And we add another set of box U with the same perspective next to Q.
 The box U is achieved by the increment method of perspective, the same length with the box Q.



Through such steps, we will be able to get the three boxes U, Q and R with the same length but different direction in a strong perspective. (U and Q are the same, R is different in direction)



What is the reason behind such time consuming method?
Let us get back to where we began our discussion:

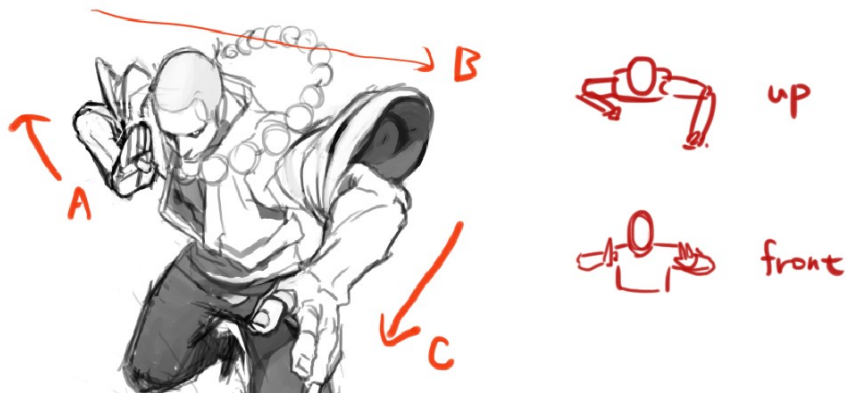


The first question was: When I wanted to draw a pose in strong perspective, is there a method to calculate the proportion relationship? I used to draw like this:

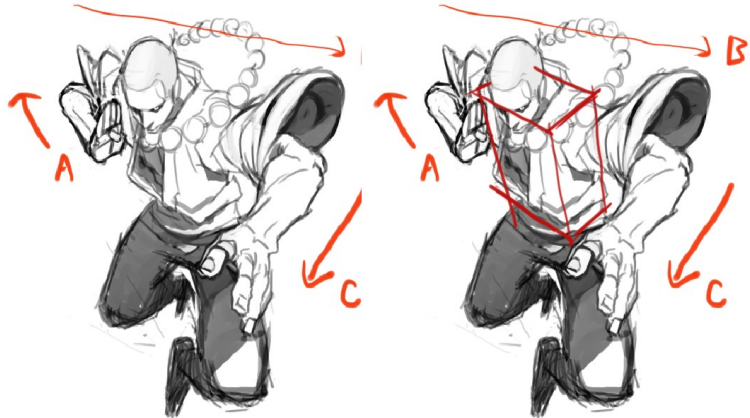
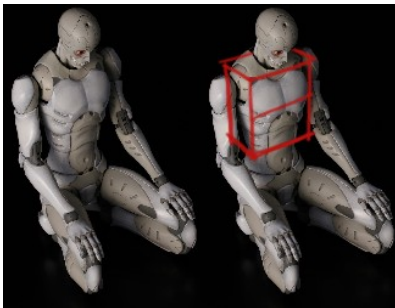


Such method will be applicable when in a normal perspective, when the perspective gets stronger, the question will be raised more often, questioning “How large should I draw?” “How did the perspective varies?” Since there was not an order to follow, I used to rely on “assumption” and “senses” to draw, so the quality varies from time to time, causing distress.

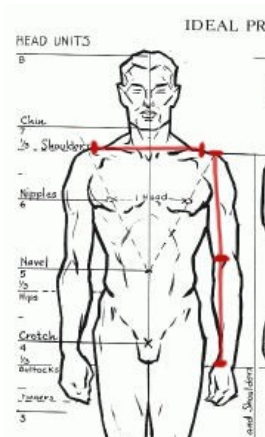
After I became more familiar with perspective, I try to think of the order within with rational methodologies.



1. On the above right is the top view and the front view of this figure. Let us assume that I am drawing the figure with his hands **hold up in front**.

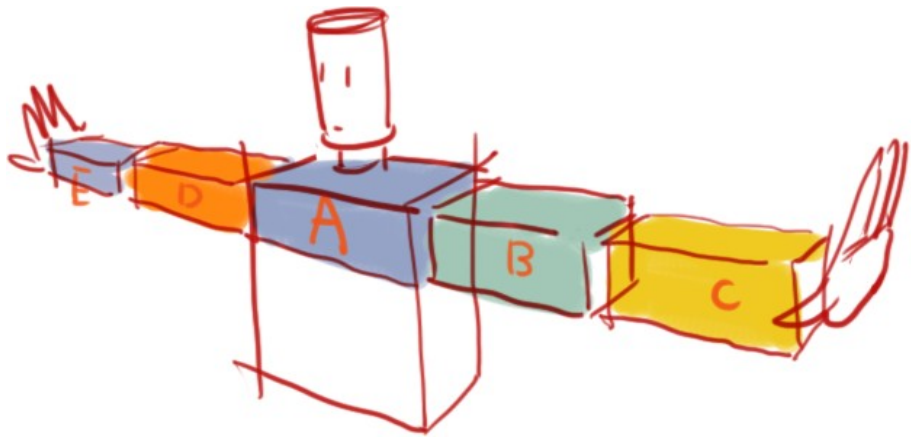


2. According to what we have discussed in # 1, there is actually a solid box perspective behind the body. Hence, the body of this monk could be seen as a solid box as well.



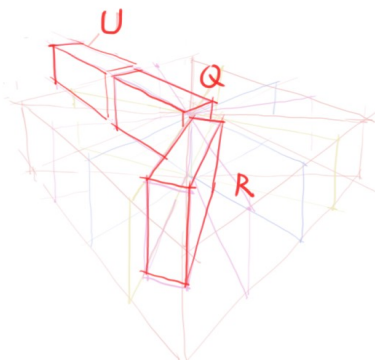
(picture from Andrew Loomis)

3. Human arms' length are close to the body's width



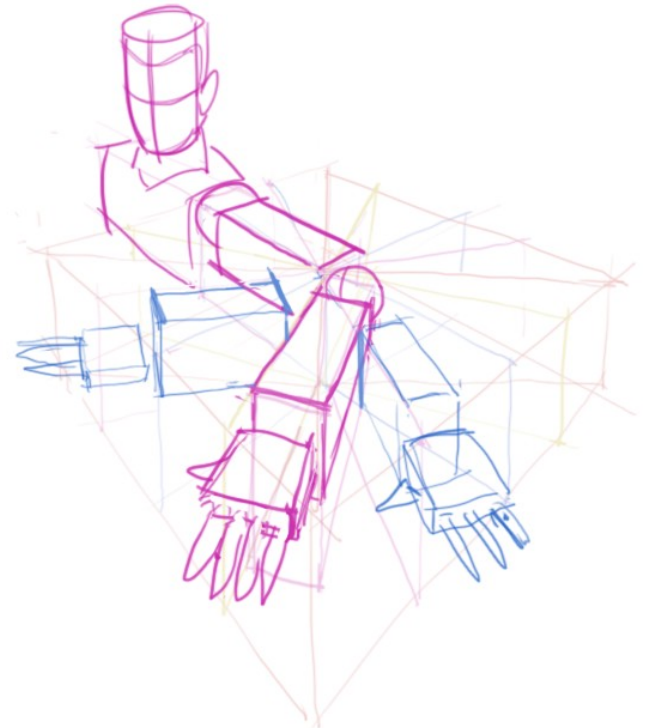
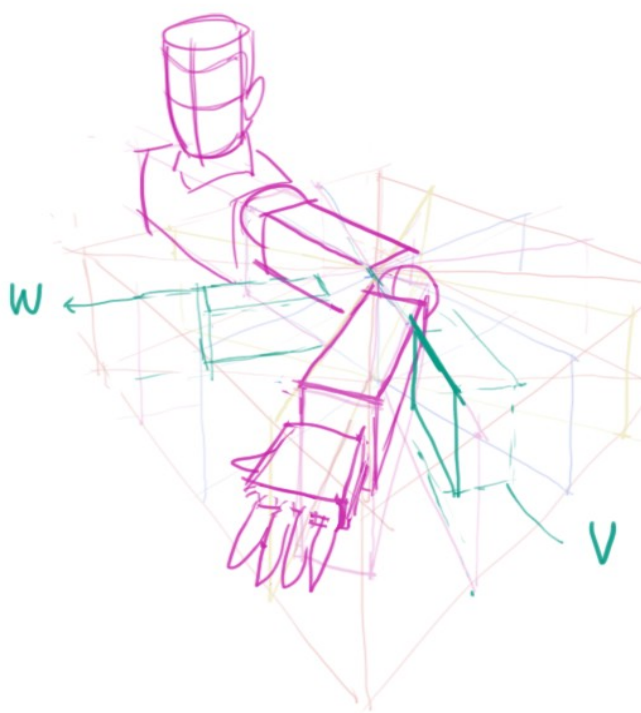
4. When we view the body and the arms as boxes (the body as (A)), since A has the similar length with the others, so in fact, they could be seen as five similar boxes in movement relations.

That is to say, the monk's arm posture is actually a theme of “a result of five boxes with the same length rotating on the same surfaces under the wide-angle lens (the original cube is under strong perspective that exaggerated the compression)” (we have discussed the rotation on the same surface in the last session, now we added another element that “the rotating objects are same in length”.)

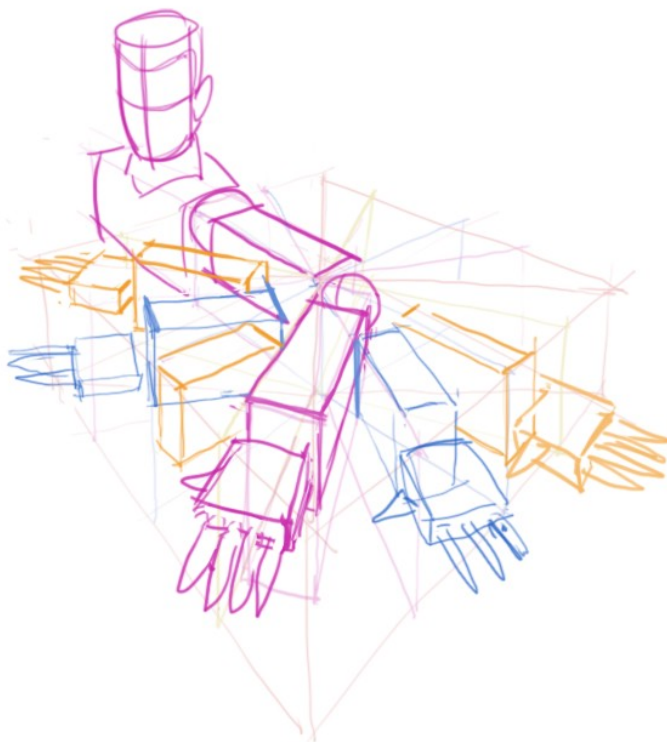


Doesn't the three boxes of U, Q and R that we have just drawn fit perfectly into the circumstances that was mentioned earlier?

Boxes with the same length (though three sets only) rotating on the same surface, facing different directions, and built under strong perspective.

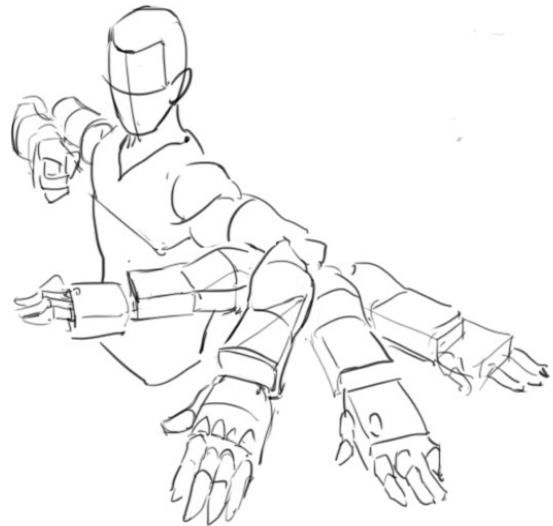
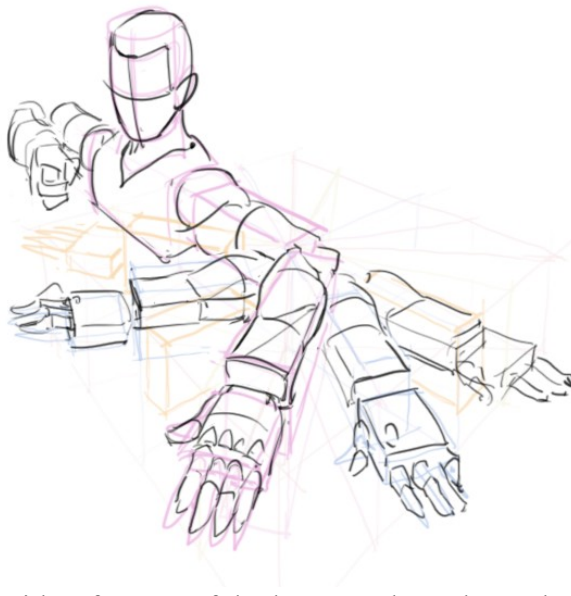
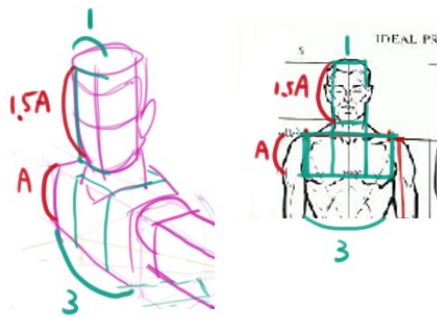


Then, I shall use the three set of boxes U, Q and R as the base, adding on the remaining parts, “body”, “arm” and “hand”. Afterwards, add on two more new boxes V and W accordingly to the planes.



Then we add on more “domino” within the middle of V and W. Now we will be able to see the track of the hand’s movement, and have a clearer basis for proportion adjustment.

The head's size, from my understanding with reference is: when the chest width is 3, the head width will be 1; when the height of the chest muscle is A, the head will be 1.5A. I have drawn this with some general idea about the proportion relationship. Though, it was drawn mainly by sensation, but since there is reference to support it, hence the “assumption” part wasn't that much.



Then, with reference of the boxes, I draw down the lines. The line art part put much more emphasis on the curves and the structure of the muscle, the edges of the boxes was rendered to a softer surface. (Some edges (the “box-ness”) are preserved for the tutorial usage.)

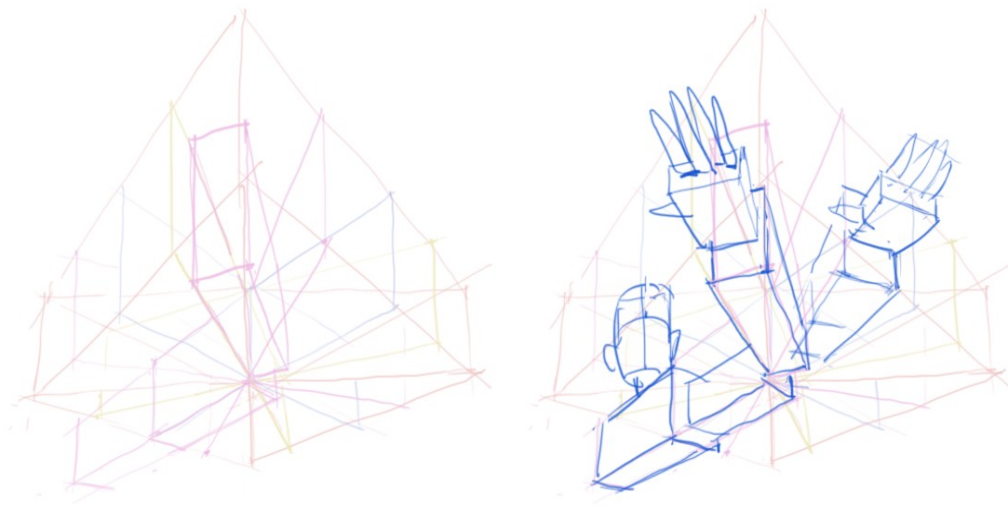
Then we close the sketch layer off, leaving the line art. Most people would only see the human, but not the perspective in behind.



Furthermore, I can draw the line art once again. This time I will render the edge even more, hiding the “box-ness” and edges, then the clues to the “perspective cube” will be harder to be observed.

When drawing the postures, it was not the question of the “perspective cube” alone. In order to have a good posture, it will also involve other elements, such as: *Gestures*, *Line of Action* and *Shape Design*. By focusing on the perspective part, I would like to emphasize that when we are drawing, we need to have a concrete idea about the space your object is in. Or else, your object will look flat.

As for the calculation of the angles, the main purpose is to turn assumption into accuracy. (But there is no need to draw yourself into the dead end and loses the fun of drawing.)



With the same set of boxes, U, Q and R, flipping the picture upside down, the perspective will turn from angle of depression into angle of elevation.